

Session Plans

- This session offers insight into several perspectives of the collaborative standardization and ownership cost reduction venture
 - The Davis-Ellis paper provided an overall vision and objectives
 - Mr. Breen's paper provides details of Raytheon's Standard Test Equipment Platform, STEP
 - Mr. Stanfield's paper covers the GWTS upgrade
 - Mr. Lohse's paper deals with a common architecture which provides a platform for GWTS and Raytheon's munitions test system
 - The paper by Mr. Insalaco *et al* looks at a common software architecture for the GWTS and the Raytheon STEP tester
 - Mr. Van Osprey's paper illustrates a multinational project aimed at improving interoperability and reducing SE ownership costs
 - Mr. Droll examines application of the common architectural elements to the next test system for the Standard missile

Presentation Perspectives

- **These papers will not offer a common test system solution, rather they illustrate custom test solutions based on a common architecture**
- **The various projects illustrate the cost and performance benefits of shared architectural features for munitions ATS**
- **They also provide real-world examples of cost savings stemming from collaboration of industry, government and FMS users**
- **Each represents a significant step towards interoperability and reduction of total cost of ownership via cooperation and standardization**

SESSION PAPERS

OVERVIEW & VISION

**STANDARD TEST EQUIPMENT
PLATFORM (MODULES)**

GWTS UPGRADE

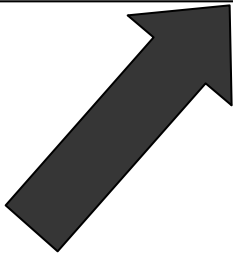
COMMON ATS ARCHITECTURE

HARDWARE

SOFTWARE

AIRCRAFT INTERFACE EXAMPLE

MISSILE AUR ATS EXAMPLE



Common Test Platform Family for Module, Board, and Sub-Assembly Level Test

Mark H. Breen
Raytheon Missile Systems
PO Box 11337
Building 9020, Mail-Stop P4
Tucson AZ 85734-1137
(520) 663-6005

- Introduction
- The STEP Family
- Cost of Test
- Reducing Cost of Test
- Early Insertion of Test
- STEP History
- Technical Overview - ANSTEP
- Technical Overview - ANSTEP Layout
- Technical Overview - RFSTEP
- Technical Overview - RFSTEP Layout

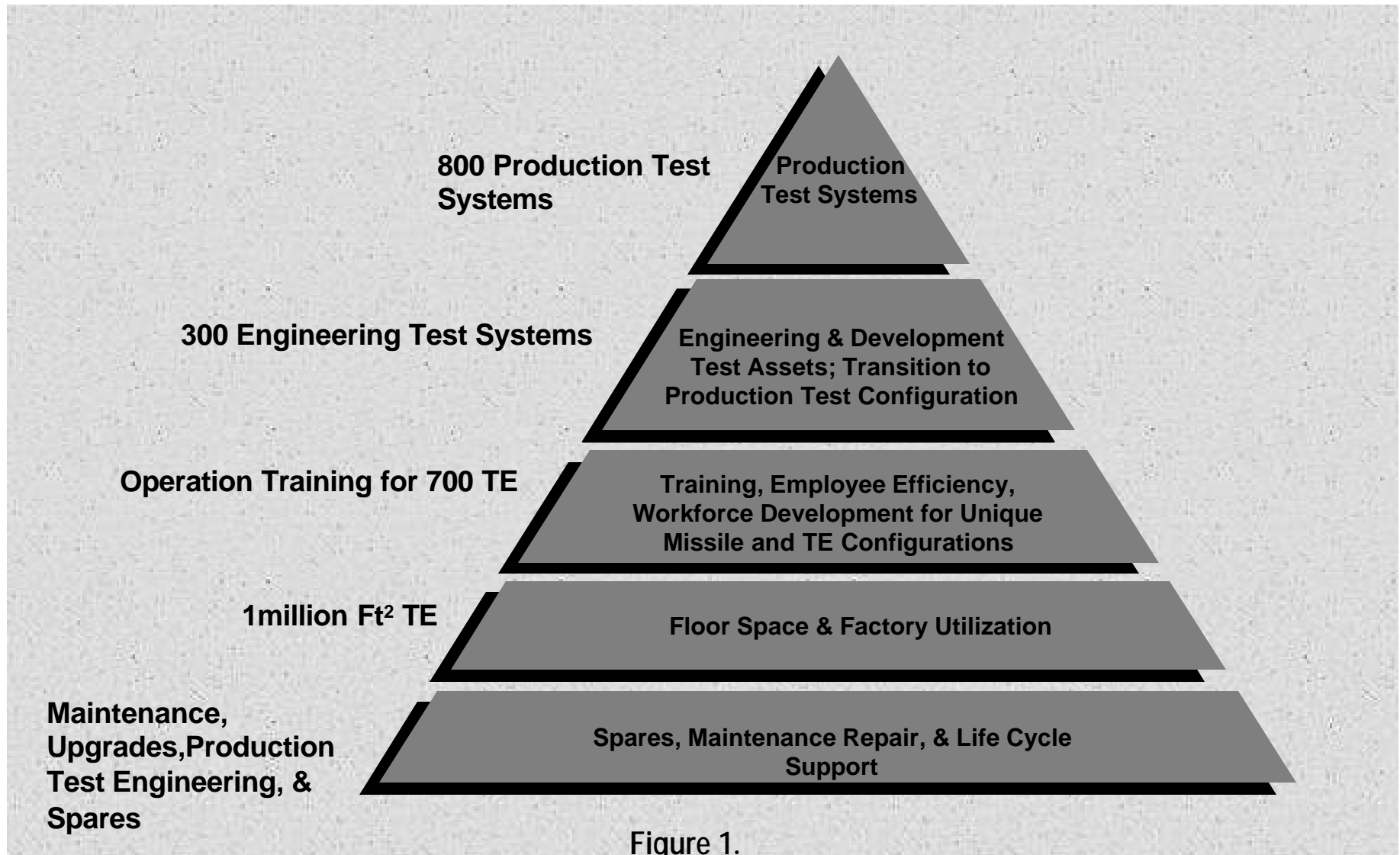
-
- Technical Overview - TPS Example
 - Technical Overview - IRSTEP
 - Technical Overview - IRSTEP Layout
 - Implementation
 - Conclusion

- Raytheon Missile Systems (RMS) capitalizes on its position of having the largest missile portfolio and integrated test system design center in the world to implement a variety of initiatives to reduce the “cost of test”
- One key initiative is the development and implementation of the Standard Test Equipment Platform (STEP) family by the Test Systems Design Center (TSDC)

- Analog STEP (ANSTEP)
- Analog/Digital STEP (ADSTEP)
- Radio Frequency STEP (RFSTEP)
- Infrared STEP (IRSTEP)
- Supports a wide variety of test levels and test regimes

Cost of Test

Raytheon



- TSDC's approach to reducing the cost of test is to utilize the STEP family to test common munitions modules, boards, and sub-assemblies across common test platforms
 - Testing common Units Under Test (UUTs) on any associated common STEP reduces the cost of product test by reducing:
 - Quantity of production test systems
 - Quantity of engineering test systems
 - Test operator training
 - Test facility floor space
 - Test system spares, maintenance, and life cycle upgrade support

Reducing Cost of Test (cont.)

Raytheon

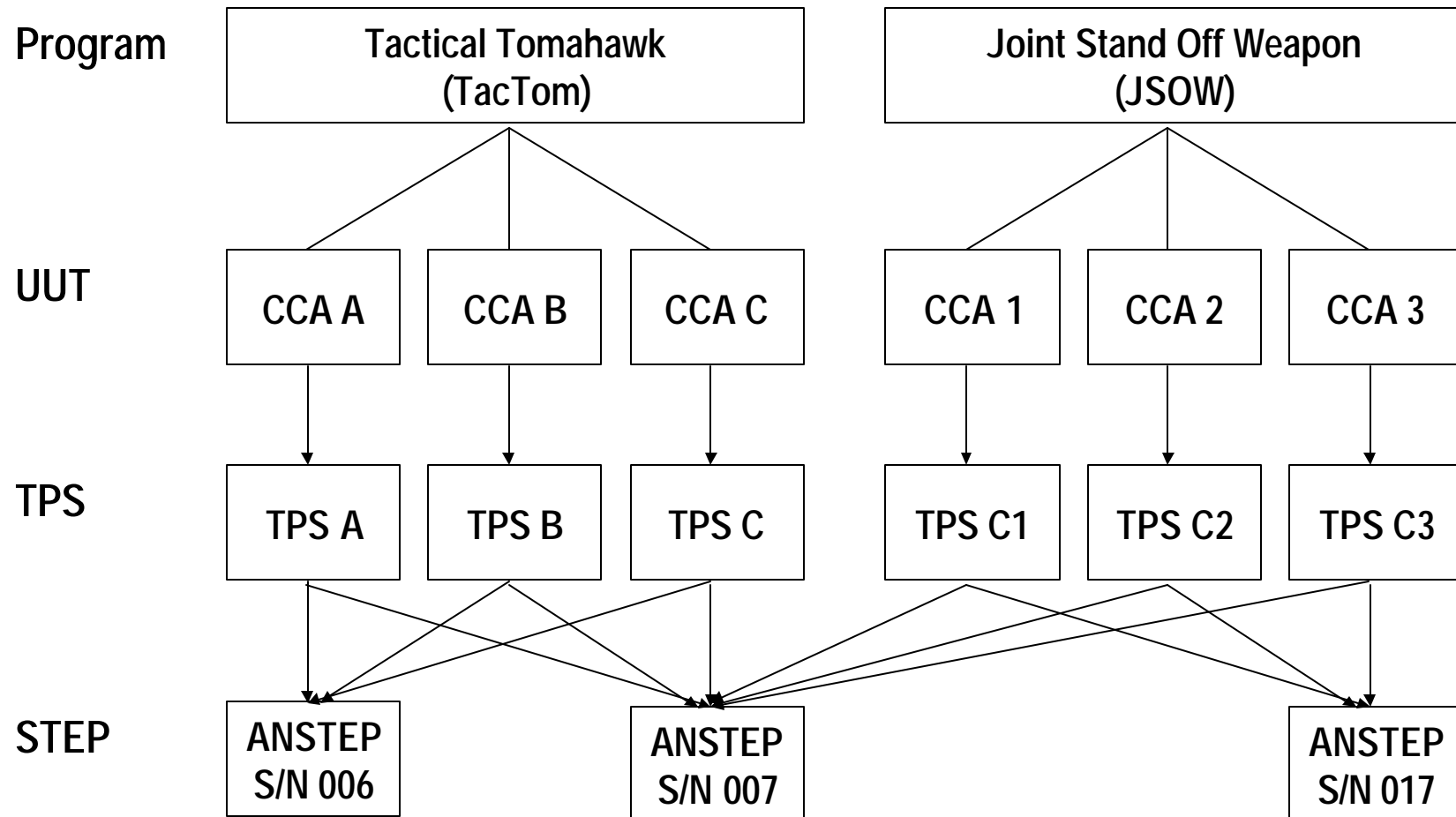
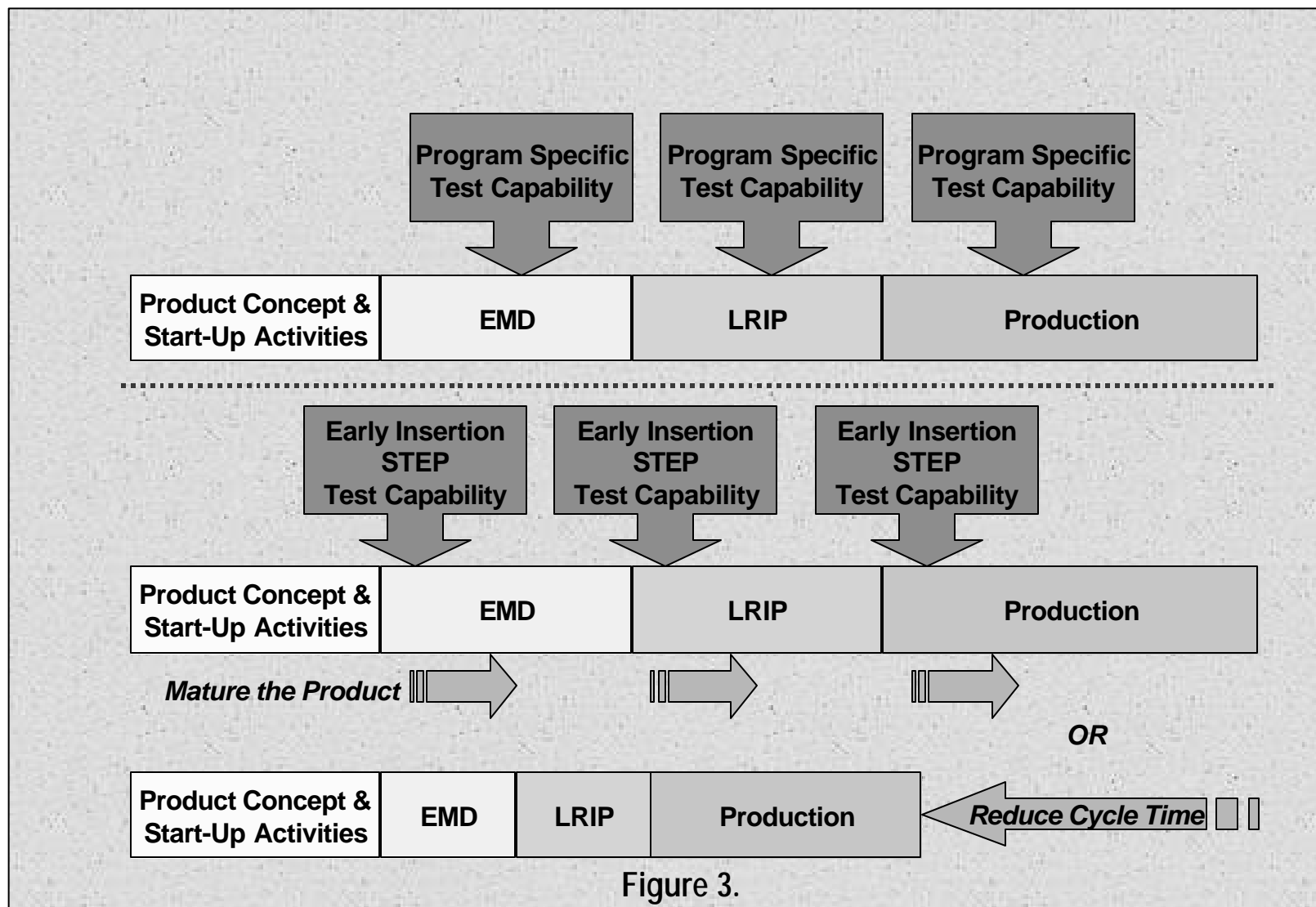


Figure 2.

- TSDC standardizes the test interface to provide a disciplined yet flexible test system design to meet program-specific test requirements

Early Insertion of Test

Raytheon



STEP History

Raytheon

ID	Task Name	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	General Dynamics Missile Systems develops a standard test system															
2	Standard test system utilized for SM2 Block IIIB Engineering IR Seeker test at GD															
3	Hughes Missile Systems Company (HMSC) develops STEP prototype based on the HMSC Coyote-Works and legacy GDeffort															
4	Prototype Analog STEP delivered to Stinger production and AIM-9X engineering at HMSC															
5	Raytheon transits ANSTEP from a prototype to production AN & AD STEP model															
6	Raytheon develops RFSTEP															
7	Raytheon manufactures and delivers multiple ANSTEP, ADSTEP, & RFSTEP to engineering and production programs (ON GOING)															
8	Raytheon develops IRSTEP for Advanced Multi Munitions Program															

Technical Overview - ANSTEP

Raytheon



Technical Overview - ANSTEP Layout

Raytheon

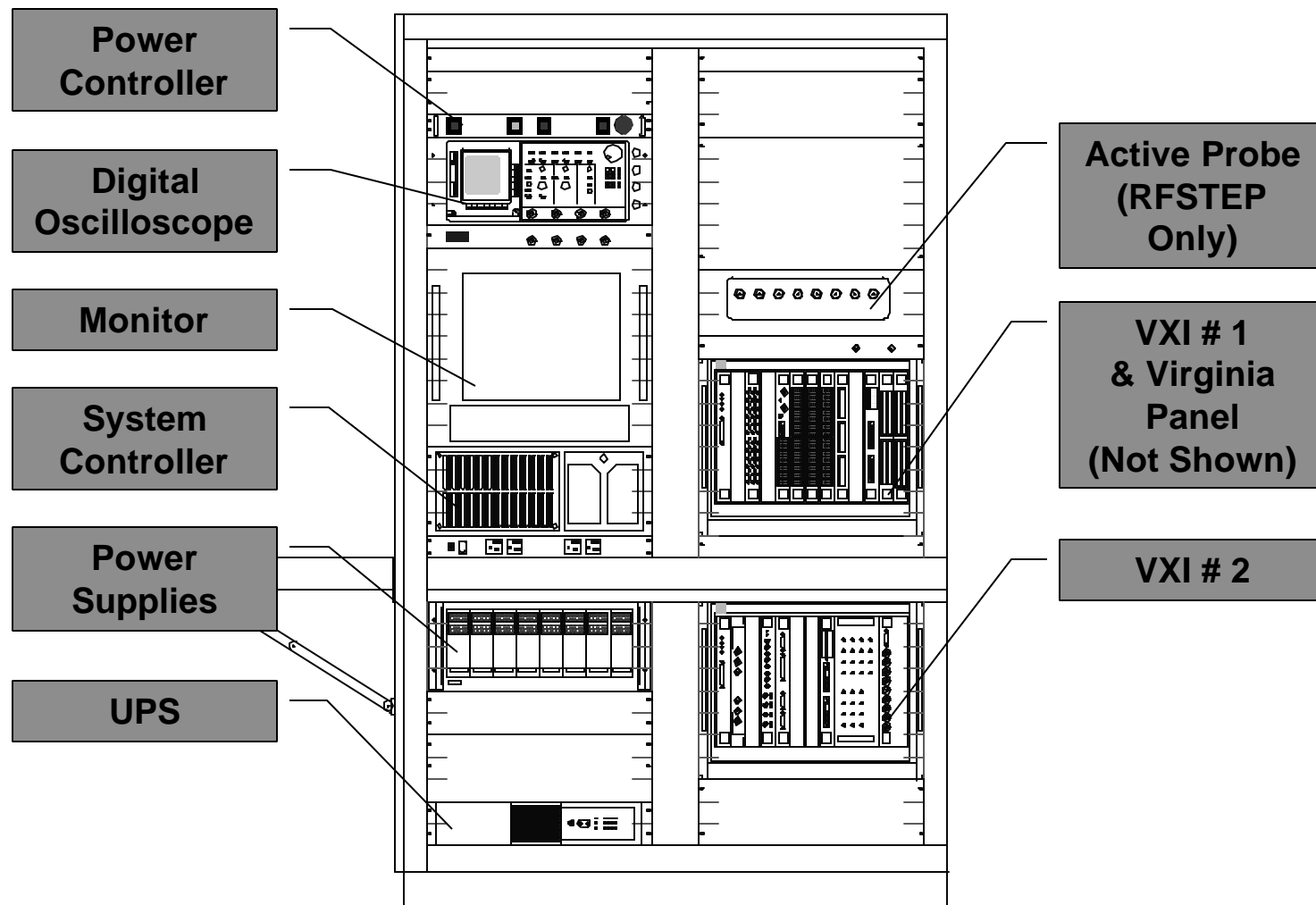
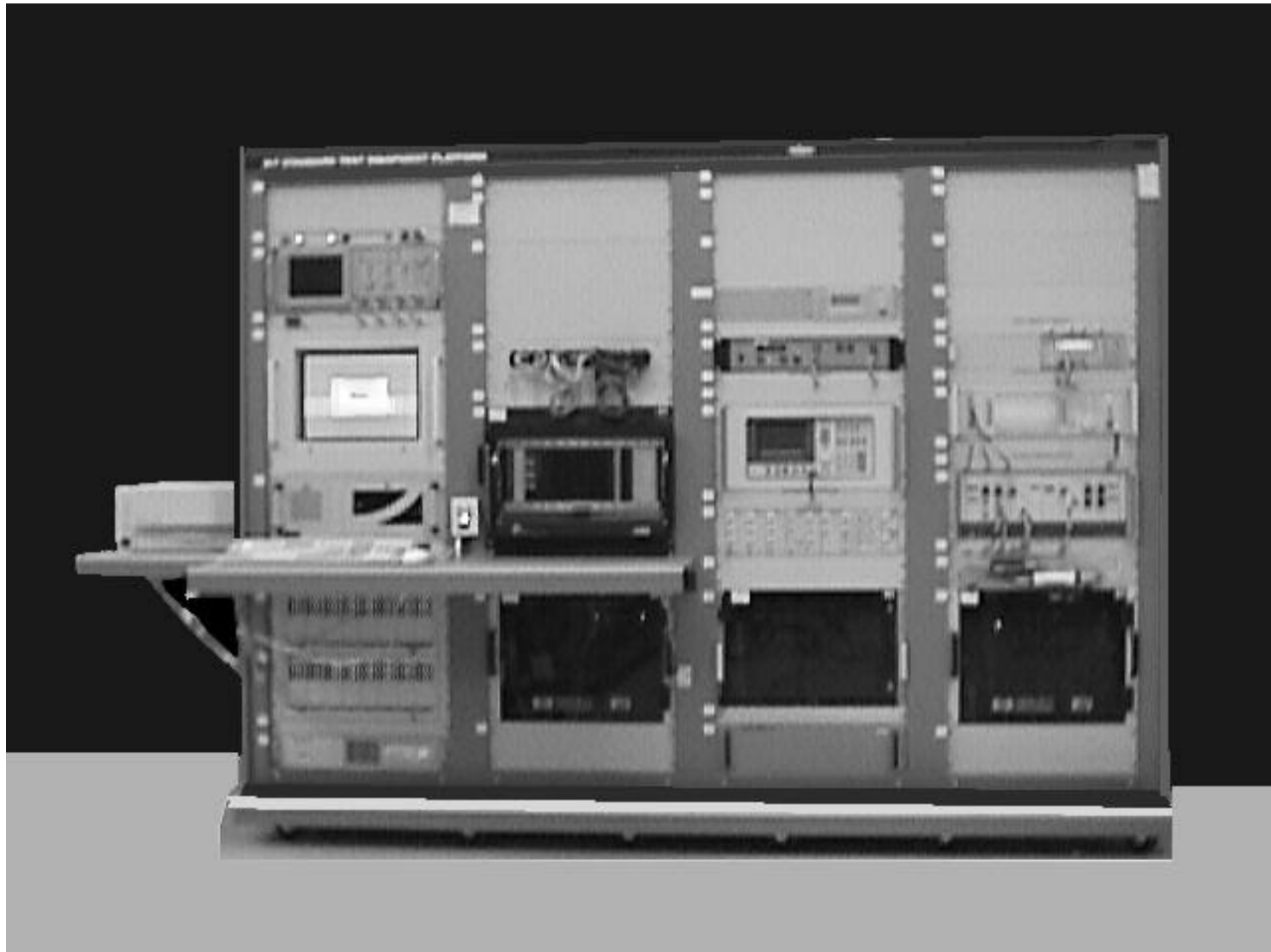


Figure 4. ANSTEP, ADSTEP, & RFSTEP Two Bay Core

Technical Overview - RFSTEP

Raytheon



Technical Overview - RFSTEP Layout

Raytheon

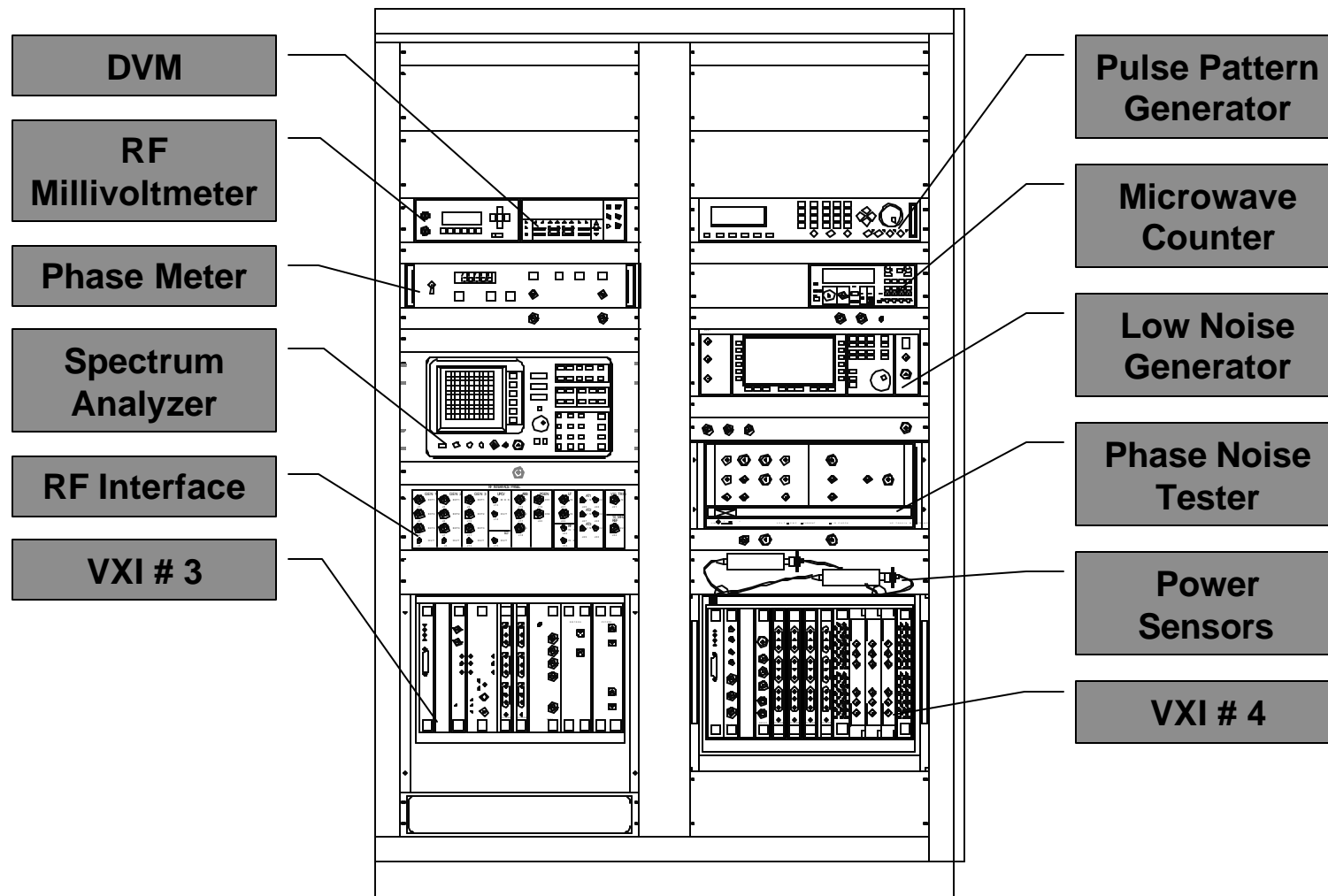


Figure 5. RFSTEP Bays 3 & 4

Technical Overview - TPS Example

Raytheon

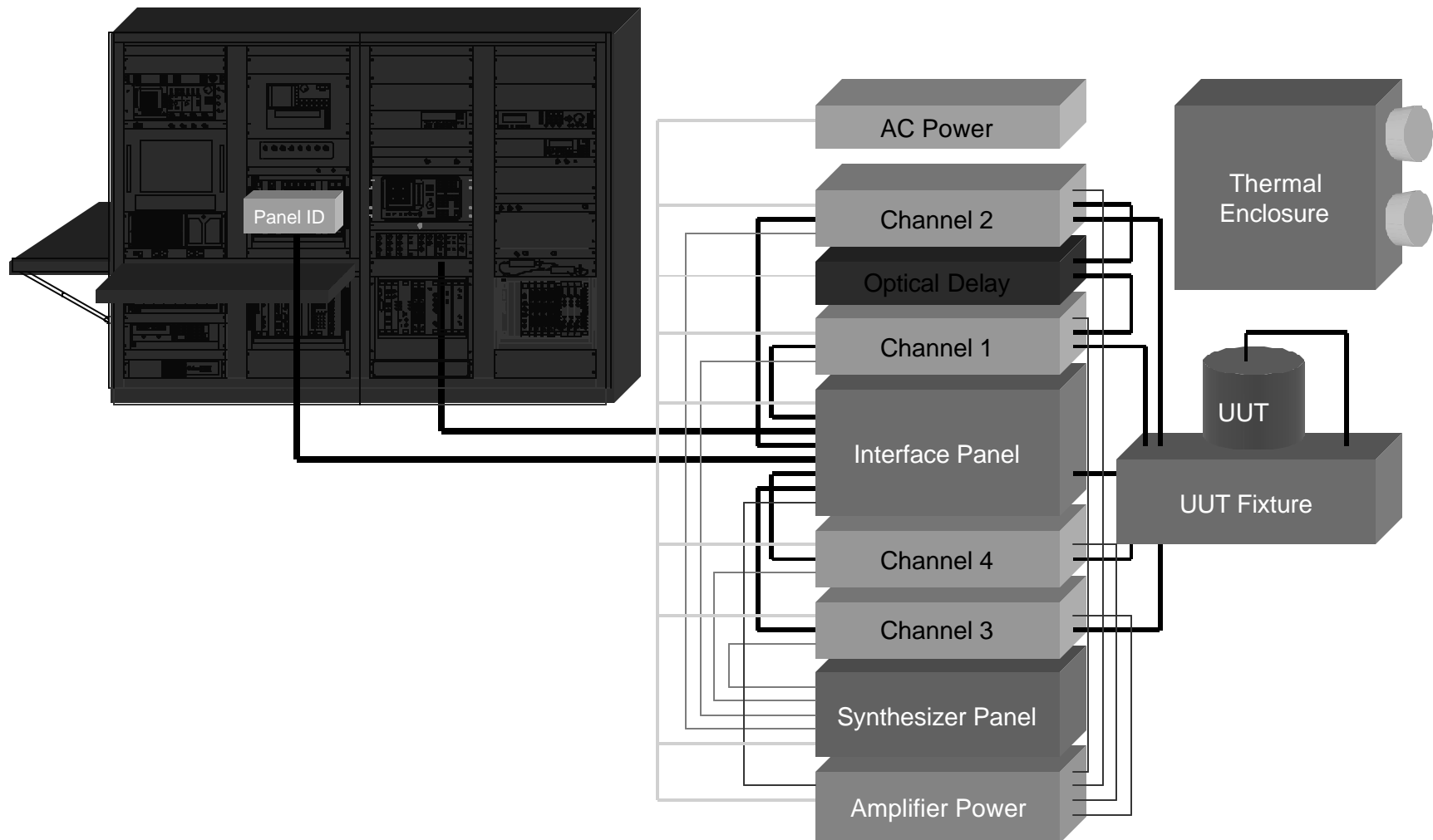


Figure 6. Example of TPS on RFSTEP

Technical Overview - IRSTEP

Raytheon



Technical Overview - IRSTEP Layout

Raytheon

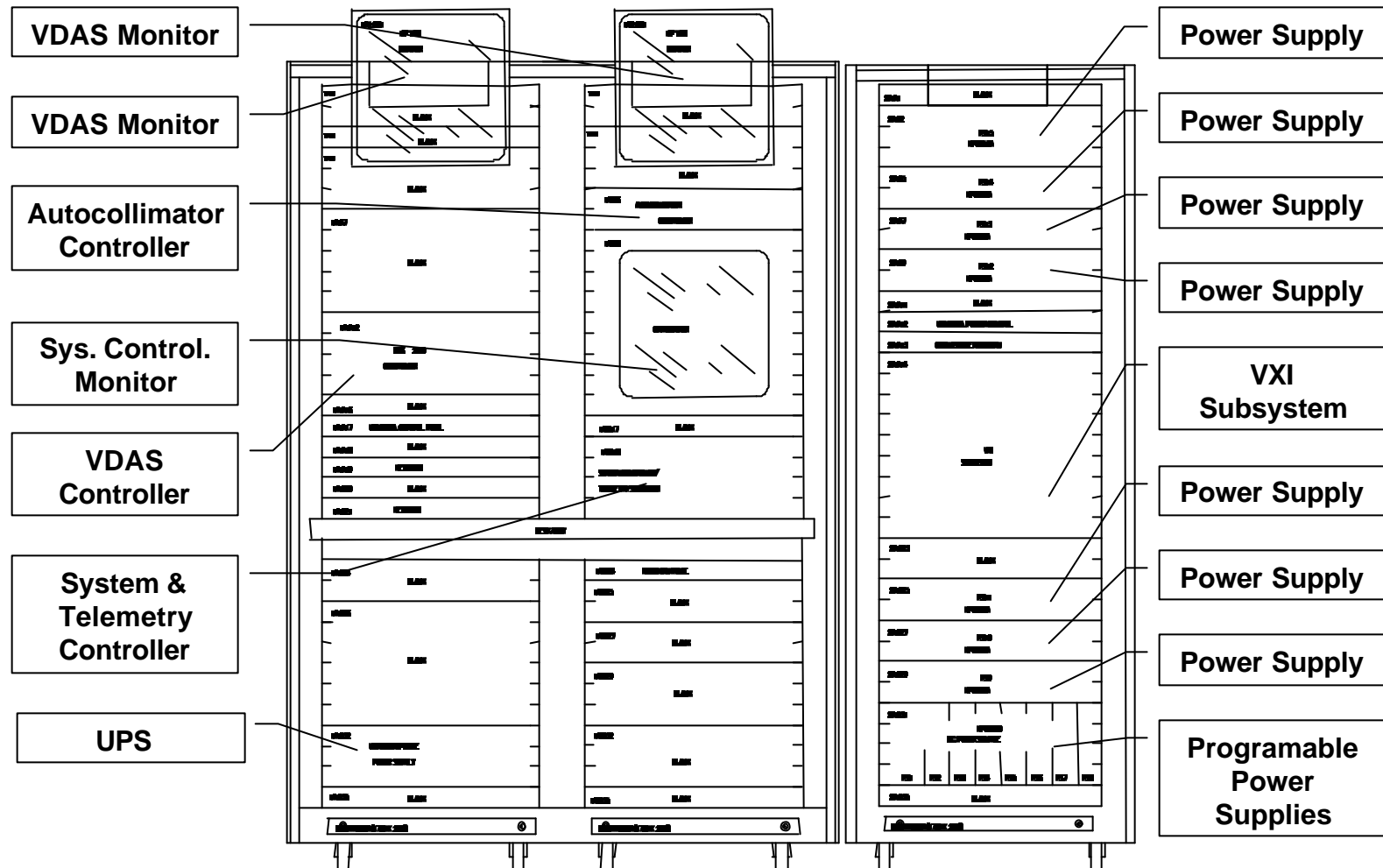


Figure 7a. IRSTEP

Technical Overview - IRSTEP Layout (cont.)

Raytheon

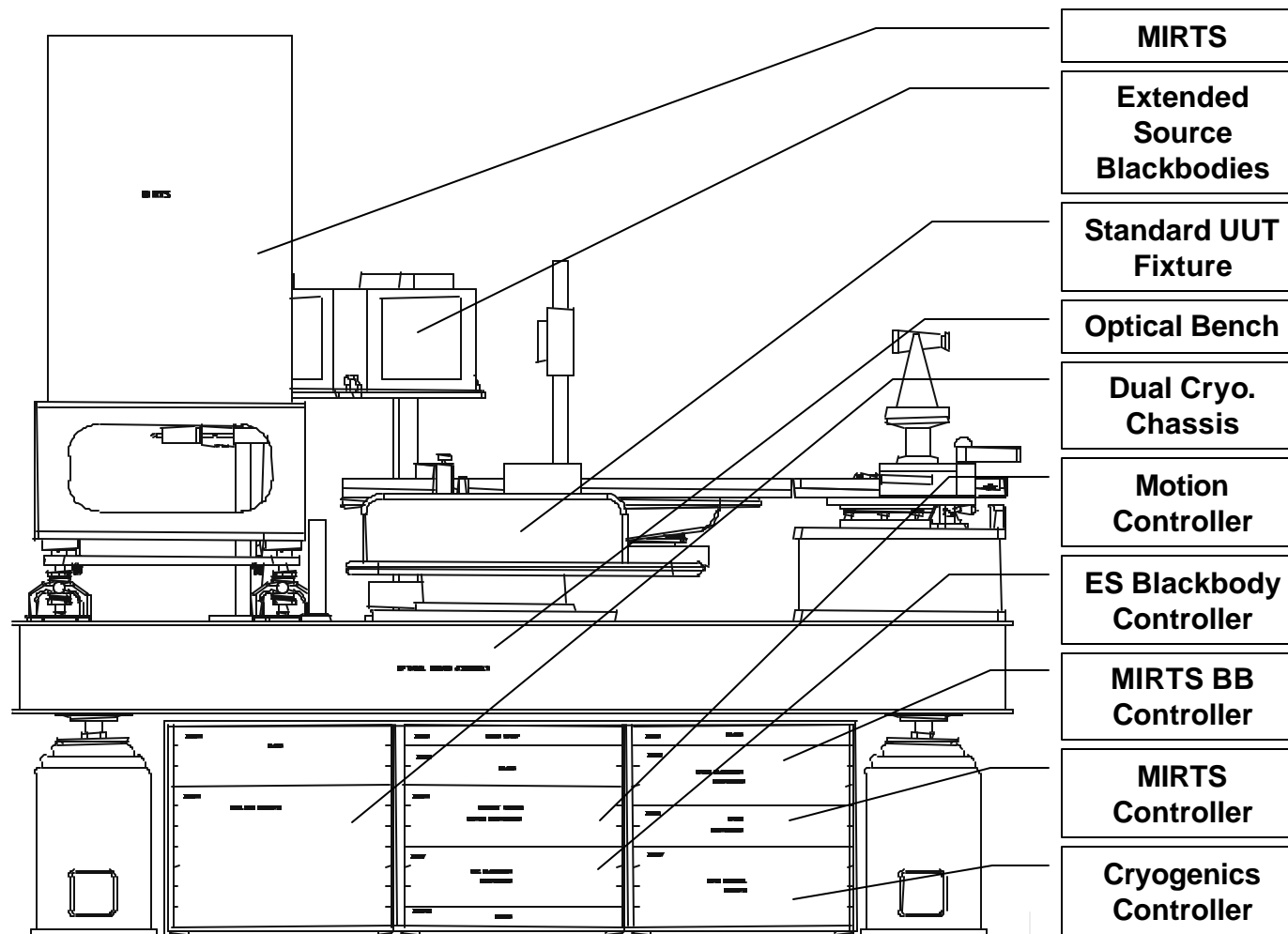


Figure 7b. IRSTEP

- 23 STEPs deployed on multiple programs throughout RMS
- UUTs tested span an extensive range
 - low-level analog CCAs, digital CCAs, Electronic Units, Control Actuator Systems, IR Seeker Heads, to IR Guidance Sections
- To facilitate inter-program utilization of STEPs throughout RMS, TSDC procured and deployed capital STEP assets to augment the program procured STEPs (typically used for intra-program multiple-UUT test)

- RMS TSDC developed and implemented the STEP family to reduce the cost of test
- STEP Family is utilized to test common munitions modules, boards, and sub-assemblies across common test platforms to reduce test system cycle time and the cost-of-test

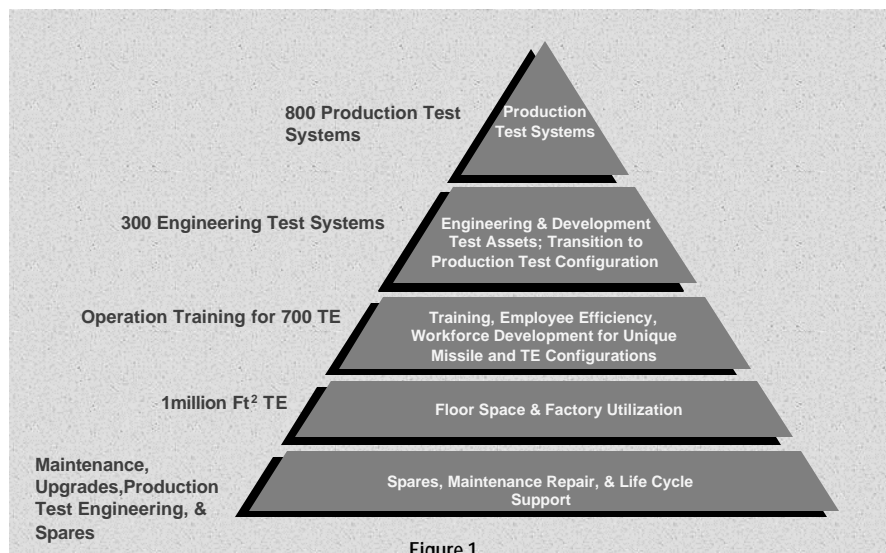


Figure 1.